The Informal Institutions and their Effect on Foreign Aid Success: The Experience of Japanese Funded Walawe Left Bank Upgrading and Rehabilitation Project in Sri Lanka

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Abstract

In order to evaluate the effects of local institutional setting the project titled, "Walawe Left Bank Upgrading and Extension Project" in Sri Lanka, funded by the Japan Bank for International Cooperation was selected for the study. The project has commence on two phases; phase one to upgrade the existing, but now degraded irrigation facilities in the northern half of the Walawe Left Bank (WLB); and phase two to develop new area for cultivation and settlements in the southern half of the WLB area. The irrigation system has operated effectively in the existing areas but with improvements in irrigation efficiency much below design. The institutional environment in the area, both formal and informal, has not been fully compatible with the assumptions of the project design. Inefficiencies in the formal institutions and relaxations of informal institutions have driven encroachment of land resources and inefficient water usage in the area, threatening the sustainability of the project. Provision of irrigation facilities at no cost to farmers, combined with limited farmer participation in designing, has resulted in low levels of system ownership. In turn, this has contributed to widespread damage to structures and water wastage. The development of the extension area seemed unwarranted until the institutional set up is strengthened to address the needs of the locale.

* This paper is prepared by Hansamali Pitigala under my supervision.

Ⅰ. Introduction

In recent years, a number of studies have focused on measuring the impact of institutions on socio economic development. However, the affect of these institutions on effectiveness of foreign aid utilization is not much studied. Findings of these studies are important as they suggest that institutional quality may trigger economic under development. However, interpretation and policy implications of these findings depends on understanding the specific channels through which institutions affect growth, and the reasons for institutional change or the lack thereof. However, it is important to pay attention to how changes in resource endowments can cause individuals to change their economic behavior within a given institutional context and potentially cause the institution itself to change in the longer run in developing countries.

Institutions are generally defined as "constraints that human beings impose on themselves" (North, 1990: 3). Other scholars include organizational entities, procedural devices, and regulatory frameworks in their definition of institutions (Williamson, 2000: 595). Therefore for this study institutions will be defined as "a set of rules, norms and constraints including their enforcement arrangements, which guide behavior, intentions, norms and beliefs through human incentives in pursuing a goal".

The types of institutions covers in the literature[1], ranges from informal access and conservation rules to more formalized community systems and laws. Most of the reviewed studies (McMillan and Woodruff, 2001: 637-658; Jutting, 2003: 26; Platteau, 2002: 1-54) look at a particular institution and its particular impact on development outcomes. Informal local institutions are not only explicitly taken into account but are found to be a key element in understanding the management of natural

1 The quality of the institutions is not prior defined as in most of the cross sectional studies.

resources, market development and conflict management. In the area of natural resource management, informal institutions define the access to common goods and the rights of use. The studies come to the conclusion that they are available at low cost and are quite flexible though some studies pointed out that the rules of access and use defined by informal institutions might not prevent a continuing degradation of resources. Informal institutions in most cases have a positive effect on market development. They do so by contributing to lowering transaction costs and reducing risks, thereby making market transaction possible at all in an environment characterized by huge information asymmetries.

The literature (Dollar and Levin, 2005: 1-25; Isham and Kaufmann, 1999: 149-184; Isham et al., 1997: 219-242; Kaufmann and Wang, 1995: 751-765; Knack, 2001: 310-329; Boone, 1995: 289-321; Alesina et al., 2000: 33-63; Shirley et al., 2004: 1-48) on the impact of institutions on development outcomes has shown that the institutional environment can either promote development outcomes or be an obstacle to it. It also emerges that this depends not only on the "quality" of the institutional setting in itself but also on factors like the local setting or the interests and behaviour of the actors involved.

The present study focuses on the role of formal local institutions in irrigation resource endowments through Japanese aid, in Sri Lanka. First it attempts to assess the overall benefits of the project. Then the study focuses on two main informal institutions, namely land management systems and water management systems existing in the area, and their interrelationship with the formal institution involved in project implementation. Specifically concerned formal institutions are the Mahaweli Authority of Sri Lanka (MASL), The Consultancy Company and the Farmer organizations. Finally how these interrelationships have affected the realization of the expected benefits form the project and its sustainability will be reviewed. Viewing development, as a mere set of

technical engineering endeavors, is impractical as irrigation management is an important a social issue. The outcomes of the project are governed by the evolution of the behavior and choices of the different actors concerned, in which their interests, mindsets and strategies are embedded. It is important to pays attention to how changes in resource endowments change behavior within a given institutional context. Such a focus is particularly relevant when thinking about institutions in developing countries, since development, by definition, is about change.

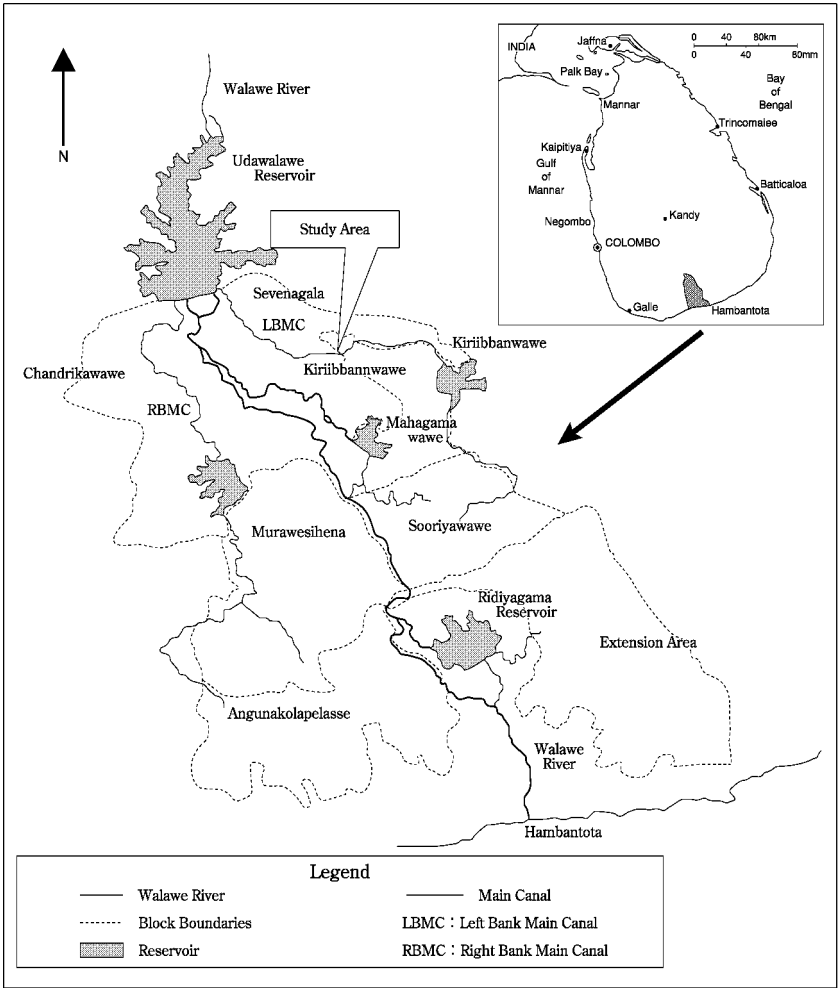
Walawe Left Bank Upgrading and Extension Project

The project[2] titled, "Walawe Left Bank Upgrading and Extension Project (WLBP)" was launched in 1997 with loan assistance from Japan Bank for International Cooperation (JBIC), to further expand and upgrade the irrigation infrastructure in the Walawe River Basin. The project was designed in two phases; rehabilitate and upgrade the existing irrigation areas under Phase I, and further development of additional 5,200 ha of the down stream of Left Bank in Phase II which is identified by the project as the "Extension Area" The estimated cost for completion of the project was US$143.5 million (1995 prices), which included US$33.5 million for the rehabilitation and upgrading of the Existing Area and US$110 million for the development of the Extension Area. Phase I of this project has been completed, providing new irrigation facilities to an additional 1,600 ha of land and improved irrigation facilities (concrete lining of all canals) to about 2,400 ha of existing irrigated areas in the Kriibbanwewa and Sooriyawewa blocks (see Figure 1). At present,

2 Development of the Walawe basin, a large-scale irrigation, resettlement and rural development project was initiated in the 1950s as some of the first in the wave of agrarian settlements of the post-World War II period in Sri Lanka. The project was conducted in several stages, where the Asian Development Bank funded the initial phase.

LBMC irrigates a total of 6,000 ha of land. The Extension area to be developed under Phase II of the project is presently rain fed or under traditional slash and burn cultivation, which is called 'chena' cultivation. With the completion of the project, the total area under irrigation would increase to 11,200 ha in the WLB.

Figure 1 Udawalawe Irrigation Area



Project implementation and management involves four main organizations. First, Japan Bank for international cooperation (JBIC) has provided a concessional loan in financing the Walawe Left Bank Upgrading and Rehabilitation Project. Second, apart from the responsibilities on project planning and implementation activities, Mahaweli Authority of Sri Lanka (MASL) is responsible for water releases from the Udawalawe reservoir and administration of the land under the irrigation scheme. Third, the Nippon Koei Engineering Consultancies (PVT) Ltd. was hired as the consultancy company by the MASL. They are responsible on overseeing planning, and implementation activities. Finally the farmer organizations manage the field canal system and represent the farmers towards the MASL.

Ⅱ. Perceptions of the Villagers' on the Project Outcomes

The overall objective of the Walawe Left Bank Irrigation Upgrading and Rehabilitation Project (WLBP) is to expand the command area of the Udawalawe reservoir. It consists of rehabilitations of the existing area, which comprise of the study area, and expanding the irrigation resources to the extension area. In order to achieve project objectives, the efficiency of irrigation water usage in the system must be improved. The same quantity of irrigation water that has been utilized so far only by the existing areas, must be used by both existing and extension areas after the completion of the project. Thus the farmers in the existing cultivation areas, who have experience abundant irrigation water until now, must entail limitations in water use. Although the farmers in the area were aware of the extension of the projects, Table 1 depicts that none of them were aware or expected a limitation of available irrigation water in order to supply water to the extended areas. Almost all the

farmers (97 percent) anticipated better and timely availability of irrigation water, while 62 percent of the farmers expected a better water distribution in the distributary and field canals. Although only 12 percent of the farmers expected to increase the cultivable land, many of them (67 percent) expected an increase of productivity. Thus it is clear that farmers' expectations are mainly on improvement of water availability, and distribution within the existing system.

Table 1 Farmer Perceptions on Project Benefits

Perception	Percentage
Better availability of irrigation water	97
Timely availability of irrigation water	97
Increase of cultivable land	12
Better water distribution	62
Reduce maintenance cost (currency, labour, etc.)	54
Less time involvement for canal maintenance	45
Reduction in farmer conflicts over water issues	62
Increase in crop yield per land plot	67
Increase in cropping intensity	9

III. Relationship of Informal Institutions with WLBP

The study focuses mainly on two informal institutions in the locale; land tenure systems and water management systems, as the WLBP deals directly with these two aspects. The success of the project, along with its sustainability, depends on how effective the final beneficiaries are able to manage the infrastructure newly developed and bestowed. Therefore, the project objectives, project design as well as the assumptions made in order to prepare the present project design must be compatible with the prevailing informal land and water management systems. Also these prevailing informal institutions would influence the farmers' behavior in utilization of the new resources. Willingness of the villagers in the locale

to forgo external benefits and costs, as well as their inclination towards achieving of project objectives also depends on the types and quality of the informal institutions prevails.

a. Land Tenure System

The patterns of land ownership and tenure in the cascade systems have been influenced by the colonial policies[3] and land related regulations and acts during the post independent period. The people in the system have Swarnabhumi, Jayabhumi titles, Land Development Ordinance (LDO) permits or are encroachers on crown lands[4].

As division of land among progeny is not allowed in the resettlement schemes, the second generation, who are anticipating being involved in agriculture, has only two choices. One is to cultivate their father's land. If the land holder has only one child, or only one child interested in agriculture, he can name him as the successor and the land permit provisions ensure the cultivating rights of the child. But if there are more

3 The land ownership pattern in the area differs from that in many old tank villages where land often belongs to the category of *paraveni* (lands in active use when the cadastral survey was done in 1900 by the British; these lands were treated as private property from ancestral times). Absence of this type of land in Walawe cascade systems substantiates the fact that there were no communities occupying lands in this part of the country during the early parts of the British administration (Jayakody et al., 2005: 5).

4 A land grant is given to the owner of a land permit after one year, for an up land and after 3 years for a paddy lands. Two types of land grants are there. One is the 'Swarnabhoomy' deeds, which are issued under the Mahaweli ordinance no.22 by the Director General of MASL. The other one is 'Jayabhoomy' deeds, issued under section 19.4 of Land Development Ordinance by the President of Sri Lanka. Apart from the cultivation rights given by the land permit, consumption rights of many resources including forests, except the mineral resources, in the land is given to the owner. The owner can sell the land only under the permission of the RPM, with the preparation of the deed by an authorized Notary-of-law. This land grant can be used as collateral for many banks in taking loans.

than one descendant, they have to either share the land, compromising having the legal rights, or they have to get a lease or encroach land for cultivation, which is the second available choice. In sharing the land by the descendants, since the land area cultivated is small, it only permits subsistence farming, with little excess yield for the market. Thus leasing land and encroaching land for cultivation pose an attractive option for this new farming community.

Land Encroachment: Cultivating land without legal rights in the study area is not uncommon. Mainly, two groups of land encroachers can be identified. One is the group of farmers practicing encroached farming because they do not have access to other legal land. The other group of farmers practice encroached farming, in order to increase their land extent, in addition to their legally received land. As shown in Table 2, land encroachments of paddy lands are greater than upland, and most of them (68 percent) are land less farmers.

Table 2 Distributions of Encroached Lands (Percentage)

Category	Paddy land	Upland
Encroachers with own land	10	3
Encroachers without own land	68	7
Encroached land leased out	3	3
Encroached land leased in	3	3
Total encroached	84	16

The encroachers always attempt to get the best land available for cultivation. Thus their most interested area is the reservation area of the 'Kiriibbanwawe' tank, where abundant water is available for cultivation[5]. This situation has been controlled to some extend in the study area,

5 Seepage water contributes to the water availability and besides that, water is stolen (Buysse, 2002: 8).

mainly through the involvement of farmer organizations. These encroached farmers usually do not like to shift from their land, because they perceive that the any land option available at another place is substandard to his current possession. Hence, the authorities are facing a problem in relocating encroached farmers to other suitable land plots, in order to develop the land according to a specified plan. This problem is magnified by steps taken by the authorities to regulate the encroachment problems. Through this regularization programme, farmers who had been cultivating their encroached lands for more than a stipulated period of time are permitted to apply for a land permit, and thereby given the ownership of the cultivated land for themselves. Although this is a step taken as a solution to the encroachment problem, on the other hand it act as a positive incentive for the farmers to go on encroaching lands, with the prospect of obtaining the legal ownership in the future. Therefore, the steps taken as a solution have been acting as a boomerang in intensifying the problem in the area. Therefore the best solution lies at controlling the encroachment before it actually takes place. In the study area, this has been successful in concerning the reservation areas of the tank, where the farmer organization has acted as a controlling mechanism in steering up oppositions for such activities in the study area. But the same force does not act accordingly when the encroached lands lies elsewhere. This is because the farmer community in the area does not see encroachment itself as a problem to the system, only their perceived threat to the tank if the reservation areas are been cultivated. They see the encroached farmers as their peers, where some of themselves are practicing it, and view it as a practical solution for a landless farmer to be engaged in.

Renting and Lending of Land: As has been discussed under chapter five, the land rights given by the land permit or grant, does not allow the land holder to lease or rent out any land for more than one year period. But

in the informal setting, two land exchange systems were widely practiced in the study area. These two systems are called 'Ande' and 'Badde' systems. There are not much difference between the exchange provisions of the two systems, but bade system indicates a long term land lease, where as 'Ande' system is on average only for a 2 to 3 year period. The tenants have the secure access to the field, but provide a stipulated yield as rent to the absentee land owner, in this case the land permit holder. The practice of these two land renting systems in the study area is shown in Table 3. In the 'Ande' system, either the land owner or the tenant farmer provides all the seed and fertilizer requirements in the study area[6]. The person holding a land permit has access to seed and fertilizer at subsidized prices. Therefore the general practice in the area is for the land permit holder to buy the fertilizer and seed at the subsidized price and provide it to the cultivator. The yield share varies with each and every agreement with the two parties, but the average is around 750 kg per acre per season. This amount usually does not change upon yield. In the 'Badde' system, the land owner shares less responsibility as all seed and fertilizer is provided by the cultivator himself. The yield share in this system also varies according to the agreement, but the average is 700 kg

Table 3 Provisions of Land Exchange Systems (Percentage)

	Ande			Badde		
	Seed	Fertilizer	Yield share	Seed	Fertilizer	Yield share
Cultivator	100 (6.6)	100 (6.6)	Rest of the Yield	100	100	Rest of the Yield
Land owner	100 (11.3)	100 (11.3)	758.8kg/ac	—	—	701.1 kg/ac

Note: The value in parenthesis shows the percentage of farmers.

6 This differs with the most common land tenure practices in the country where, the land lord and tenant share 50: 50 in seeds and fertilizer inputs and the land lord gets 25 percent of the total harvest, as been provided by the paddy land act in 1958.

per acre per season to the land owner.

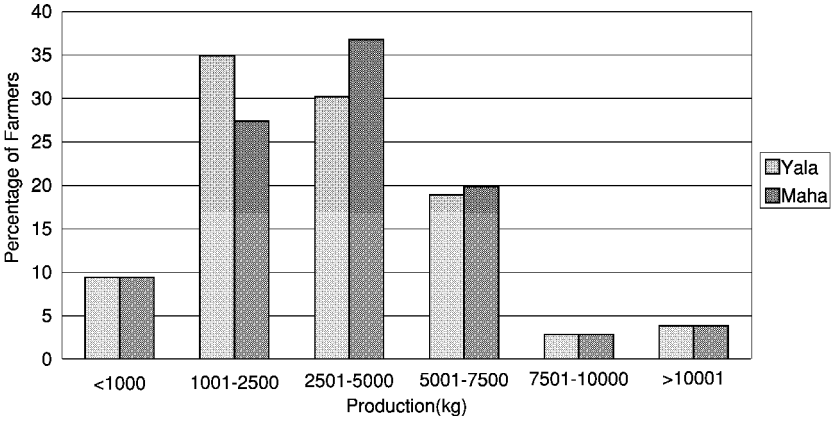
The farmers who cultivate land under “Ande” and “Badde” systems can be identified as follows: One group consists of the first generation land holders, whose land is now cultivated by their second generation. The land holder has rented the land to his children, to cultivate and receives only the rent, for his subsistence[7]. In this case, if more than one cultivator is sharing the land, in the case the land holder has many children, the children divides the rest in equal shares. This is mainly subsistence paddy farming. The other group of cultivators is the large scale market oriented cultivators. Apart from cultivating their own land, they rent out nearby lands, in order to increase their scale of cultivated land, thus increase the profit. This implies emergence of capitalist class in the study area of the country in the recent past. The difference of these two groups is depicted by looking at the productivity of land in the study area (refer Figure 2).

Respondents who receive less than 1000 kg per season consist mainly of the farmers who have leased their irrigated land and receive an agreed amount of paddy, or who are cultivating a shared land of their parents or close relatives with siblings. Thus their seasonal yield is lesser and does not vary. Farmers with larger yields (greater than 7500 kg) are mostly farmers who have taken others lands on lease. Their yield is greater due to large land area cultivated, and varies little seasonally. These large scale farmers have the means and resources to face common agricultural problems, such as water scarcity or insect damages. But the respondents with intermediate yield often are owner farmers, experiencing a yield change according to the season, with a comparatively higher yield in the Maha season. Their yields are highly susceptible to water scarcity as well as other agricultural problems.

7 Renting out to own family members result lower rent (less than average) compared to renting out to non family members.

Figure 2 Total Paddy Productions in the Area

(Including Both Seasons in 2005/06)



In addition to tenurial patterns referred to above, other land tenure systems exist in the area are mortgaging and renting. These however are limited to marginal farm households in the system. The households resort to land mortgaging when a need for a large sum of money arises at a time for an unforeseen purpose. The land is cultivated by the mortgagor until he recovers his loan with a high interest, normally greater than 100 percent per year. If the farmer cannot repay the loan and the interest before the agreement is expired, ownership shifts to the mortgagor. Land mortgaging is practiced mainly for paddy lands. The land renting is practiced for uplands such as coconut lands, where the owner lease out the land because of a financial requirement. Here, the renter uses the land for a specific period, depending on the amount of money sought in the form of loans. The land ownership reverts to the original owner after the termination of the agreement, unless it has been extended for further loans.

These various land tenure systems exists as survival strategies of the farmer community. Although in one aspect it can be defined as highly exploitative, given the choices, the farmers perceive these as their best

options available. This also allows the farmers to manipulate the existing land regulations and mobilize the land resources, so as more efficient farmers have access to large land extents to cultivate, thus improve the productivity. But it could adversely affect the livelihood of the poorer farmers, leading to income inequalities and incidence of poverty in the community.

Although there is no significant change in the pattern of renting and lending of land in the area, the incident of land encroaching has been changed significantly. Even though due to the involvement of farmer organizations, land encroachment in the reservation areas of the tank has been controlled significantly, an unanticipated massive influx of encroachers has migrated to the area in anticipation of future land grants. The delays in the progress of the project in allocating and regulating land resources to its proper uses are a main reason for this phenomenon.

b. Water Management System

The institution known as “Vel Vidane” system[8] was absent in these tank systems even in the past. In this area, farmers have experienced cultivation committee systems and various other reforms successively introduced by the government in the last half a century. Involvement of farmers and farmer representatives in system operation and maintenance in these systems is due to the fact that these systems have come into operation after the abolition of “Vel Vidane” system. In such system, farmers know only about the MASL personnel and farmer representa-

8 Under the Vel Vidane system, responsibilities in system operation and maintenance were implemented by the Vel Vidane on the decisions made at the cultivation meeting. In the past, payments were made to Vel Vidane for activities like system operation and maintenance and water management through implementation of rotations during dry periods. The payment made to Vidane or farmer representative is called “uvandiram”. In the past farmers had to pay ¼ of a bushel (6 kg) per acre as “uvandiram”.

tives handling these responsibilities. The Vel Vidane system has now been replaced with farmer organizations who take lead in routine maintenance of the irrigation systems and their operations.

The responsibilities vested upon farmer organizations, extracted by interviews of farmer leaders are summarized in Table 4. It shows that although the farmer organizations are responsible of distributary (D) and field canals[9], they do not possess any legal rights to the canals or irrigation water they utilize. It is remarkable that farmer leaders perceive that they do not have responsibility in future rehabilitations of the resources.

Table 4 Responsibilities Vested with Farmer Organizations

Agreements and Functions	Occurrence
FO as legal entity	Yes
FO leaders select by farmers	Yes
legal water rights at FC level	No
Authority to make rules and sanctions	Partial
Authority to make O&M plans and budgets	Partial
Authority to set water charges	Yes
Maximum sanction available to FO	Levy fines
Control over D and field canals	Yes
Control over overall discharge and intake	No
Responsibility to future rehabilitations	No
Legal rights for canals	Partial
Right to make contracts and raise additional revenue	Yes
Right to make profit	Yes

Note: Partial indicates that the MASL has the final decision making power

The responsibility of water management in the filed level of the resettlement area lies with the farmer organizations. Field canal farmer organizations as well as distributary canal farmer organizations are involved in many activities, in managing water distribution at the field

9 The canals starting directly form the left bank main canal is referred as distributary canal or D canal, while the canals starting from the D canals are referred to as field canals. Field canals take the water to each and every field.

level. Table 5 illustrated the activities carried out by the five distributary canal farmer organizations, from here onwards referred to as farmer organizations, existing in the study area and the participation of the members in these activities. The most common practice in the area is cleaning the canal beds using labour. Every farmer organization carries out this function as their main responsibility in maintenance of the canals. It is carried out twice a season, once prior to the commencement of the season, and the second towards the mid season. Two distinguished methods can be seen in carrying out the work. Some farmer organizations decides on a certain date and every member of the organization gather and do the cleaning of the whole canal at the same time using shared labour. The second method is the farmer organization distributed equal lengths of the canal among its members and decides on a deadline for the work to be carried out. The members clean their responsible area, at different times most suited to their schedules. For the mid seasonal cleaning most of the farmer organizations adopt the second method, given the reason that it is difficult to gather farmers as their opportunity cost of labour rises in the mid of the season as they are already involved in cultivation practices and are unwilling to participate in labour sharing activities at that point of time. Although 100 percent of the farmer members engaged in cleaning of the canal bed pre-seasonally only 40 percent of the farmers were involved in mid seasonal cleaning, whereas only 32 percent met the dead line. Although this is not a severe problem for the maintenance of the canal, it poses an acute problem regarding the water distribution of the canals. When the canal beds are not clean and has silted and debris accumulated, the water flow of the canal looses the stipulated flow rate and water pressure required to carry water towards the tail end. The water logged condition benefits the farmers with the adjacent fields, where they can obtain irrigation water for a longer period of time. Thus the farmers at the head and middle of the

canal do not face any negative effect through this; rather they are benefited from the uncleaned canals. The possible externality lies for the farmers cultivating at the tail end of the canal, who do not get adequate irrigation water, when the flow rates and water pressure at the head of the canal is reduced.

Table 5 Farmer Participation in Activities Carried Out by the Distributary Canal Farmer Organizations (Percentage)

Activity	Participation
Contribution of labour for canal maintenance	100
Coordinating distribution of water among field canals	11
Educating farmers about efficient water use and management	7
Coordination among head and tail end water users	17
Harmonizing disputes among farmers on water issues	48
Contributions on decision making in seasonal meetings	11
Prepare schedules for water rotations	7
Levy sanctions for scandalous water resources	2
Collection of a fee for farmer organization	100
Collection of funds for future canal rehabilitations	0

Furthermore by looking at Table 5, it is clear of the perception of farmer organizations that their responsibility of maintaining irrigation canals lies in cleaning of the canals through labour participation. Although all the farmer organizations are involved in collecting a fee, mainly as a membership fee, for a farmer organizational fund there is no specific fund allocation for future rehabilitations of the irrigation canals. In their mind-set, any rehabilitation or maintenance activity with pecuniary requirements is out of their scope, thus a responsibility of the officials.

Table 6, relating to complaints about water scarcity, shows that the phenomenon increases towards the tail end of the canal. Since in the farmers' perception, the incident has increased after the upgrading and rehabilitation project of the left bank, they see this as an error at the

project planning. While the farmers agree that the situation intensifies because of the uncleaned head and middle canals, in their opinion the major problem lies in the design of the canals itself. The canal design exhibits three main physical characteristics: the dimensional changes throughout the canal, smaller outlet size and the special square shaped cross sectional view. Although all these three factors are interrelated in serving their purpose, they will be discussed separately in order to explain the farmer perceptions about them.

The dimensions of the canal in height, width and cross sectional area change towards the tail end of the canal making the canal smaller. It can be observed that, the canal is two or three times larger at the head end compared to the tail end. The farmers presume that the water does not flow adequately to the tail end of the canal because of its inadequate capacity. But the actual technical reason lying behind the reduction of the canal size is to maintain the required water pressure for proper irrigation towards the tail end, with a minimum utilization of water. If the canal is build at the same width and same height, in order to maintain a good water pressure for effective irrigation increases. But by reducing the width and heights of the canal, thereby the cross sectional area, the amount of water required to flow in a given period of time in order to maintain the water pressure of the canal reduces. This enables to use the irrigation water more efficiently. But for this purpose the water should flow through out the canal without any blockage. But the farmers in the study area are not willing to accept this factor, as in their experience the water flow was adequate before the rehabilitations were done, and there had been no forewarning of water limitations for them after rehabilitations.

The second factor is the size of the outlets of the field canal at the fields. The size of the outlet designed initially has been 6 inches in diameter. The initial design of the canal has been aimed at irrigating the

land in a rotational calendar where water is to be issued to a field one in 6 days. But the Reddish Brown Earth (RBE) soil existing in the area has a low water retention capacity. According to the technical engineer responsible for the area, RBE soil can hold water adequately and effectively for paddy production for a maximum period of 4 to 5 days. Thus in a 6 days rotational period, the paddy plant is subjected to a water stress resulting lower yields towards the end of the season. Thus for the project design, reducing the rotational period, optimally to a four to five day rotational calendar would have been ideal. But the farmers, who had been used to a continuous water flow to the canals, had not been ready to compromise it. Thus, they had demanded the block office for a continuous water flow in the canals. As a solution for the high water utilization in the fields, they had suggested to reduce the outlet size from six inches of diameter to 3 inches of diameter. At first, the farmer organization has initiated the structure modifications by using banana stems to reduce the outlet size. At the time of the study, the block officers have persuaded the project office to modify the structure according to their needs and all the outlets were 3-inch outlets except for the MD9 canal.

Table 6 Changes in Adequacy of Irrigation Water by the Project

(Percentage)

Adequacy of Water Receipts	Head reach	Middle	Tail end
Adequate water before and after the project	32	23	4
Inadequate water before and after the project	0	4	11
Adequate before project, but inadequate after project	0	6	10
Inadequate before project, adequate after project	0	8	3

Cost of Irrigation to Farmers: Traditionally, irrigation water has been supplied free to farmers in Sri Lanka. Attempts made by the government in the past to levy a fee from farmers were largely unsuccessful (Samad & Vermillion, 1999: 12). The "costs" of irrigation to farmers are primar-

ily the contribution of voluntary labor for canal maintenance and in some instances, the payment made in kind to the "yaya palaka" (field supervisor) employed by the Irrigation Department (ID) to oversee the distribution of irrigation water. With the introduction of participatory management, the government expected FOs to recover the cost of "Operation and Maintenance (O & M)" from farmers (Ratnayake, 1995: 71).

About 90 percent of farmers claimed that there was no cash fee on irrigation. After the transfer of O & M functions to FOs, some organizations charged a modest fee (Rs 100/ season or about US$1/season) for canal maintenance. The survey results showed that only a minority of farmers (23 percent) paid the maintenance fee. However, after the rehabilitations through the project, none of the FOs' continues collecting the fee.

Table 7 gives farmers' perception of changes in irrigation cost components before and after the project. A majority of farmers claimed that payments in kind and unpaid family labor contributions for canal maintenance had remained about the same before and after the project. Well-defined procedures for cost recovery have not been established as yet.

Table 7 Farmers' Perception of Changes in Irrigation Costs

(Percentage)

Condition	Paid in Currency	Paid in kind
Higher after project	0	7
Lower after project	98	81
Same before and after project	0	7
Do not know	0	3
No response	2	2

It is interesting to note that prior to the rehabilitation project of the left bank, most of the farmer organizations, haves collected a fee for the specific purpose of maintenance requirements of the field canals. This

fund has been collected separate to the common membership fee. But after the rehabilitation programme, these fund collection for the maintenance of the canals has been abandoned. In farmer perception, the need so far existed to maintain and repair the inlets, outlets, gates and other structures of the canal, no longer exist since the resource are new and been repaired and given to them by the rehabilitation project. Thus contingency allocation requirements are not acute at the moment. Therefore their responsibility in maintaining the field canals has been limited to the cleaning of the canal bund and the surroundings through shared labour. In their perception the responsibility of the distributary canal maintenance still lies with the Mahaweli Authority, and any requirement of the field canal, which would involve a large cost, would be overseen by the Mahaweli Authority itself.

Quality of Irrigation Service: Introduction of participatory irrigation management ought to result in an improvement in the irrigation service, as farmers have a vested interest in the irrigation service, involving them directly in irrigation management would lead to improvements in the quality of the irrigation service. Changes in the quality of irrigation service were assessed in terms of farmer perceptions on adequacy, timeliness and fairness of water distribution, and the incidence of irrigation -related conflicts among farmers before and after transfer[10] of O & M responsibilities of the canals to farmer organizations. Table 8 and 9 displays farmers' perceptions about the quality of irrigation service before and after transfer. A majority of farmers in both schemes claimed

10 The indicators specified by International Water Management Institution (IWMI) to measure water supply conditions in irrigation schemes are: Relative Irrigation Supply (RIS) and Relative Water Supply (RWS). These indicators relate water supply to demand and indicate how tightly supply and demand are matched (IWMI, 1999: 15). Water supply data were not available at the level of the transfer unit (distributary canal) to calculate above indicators.

that water supply in both the wet and dry seasons was adequate before and after the transfer.

However, about one percent of the farmers in the head-reach and about 12 percent in the middle and tail-end areas reported that water supply had worsened after project. Farmers attributed the worsening of water supply to the poor quality of work done during rehabilitation. The responses of a majority of farmers with regard to the timeliness[11] of water supply, fairness of distribution, and the frequency of conflicts over water distribution, namely, that these had not changed significantly after the project.

Table 8 Farmers' Perceptions on the Quality of Irrigation Service Before and After Project

(Percentage)

Indicator		Better after the project	Worse after the project	Adequate before and after project	Inadequate before and after project
Adequacy of water supply	Head	15	0	52	0
	Middle	5	2	8	0
	Tail	3	10	1	4
Fairness of water distribution	Head	17	1	55	0
	Middle	3	2	4	2
	Tail	1	8	2	5
Timeliness of water distribution	Head	22	1	55	0
	Middle	3	2	4	0
	Tail	1	8	2	2

Table 9 Frequency of Farmer Conflicts Before and After Project

(Percentage)

Indicator	Frequency of farmer conflicts		
	Head	Middle	Tail
Increased after project	3	5	16
Decreased after project	12	12	7
Infrequent after project	3	3	2
Frequent after project	7	12	18

11 Whether water was released timely according to crop requirements.

Operation and Maintenance of Canals: Farmer organizations bare the responsibility of the conveyance system operation and maintenance at the field canal level. With limited canal clearance, water-regulating structures in D canals were damaged intentionally or due to negligence. The most common intentional damages observed during the field survey and the motives of destructions are listed in Table 10. It is obvious that there are three categories of farmers involved in destruction. The first category is farmers who cultivate paddy land located below the D canal command area, entirely dependent on either drainage water from paddy lands or directly tapped water from the D canal. The second category is the farmers in head end reach, who do not prefer measured and regulated discharges and receive more than required. Third group is the farmers from tail end reach, who are really effected from the actions of above two categories.

Table 10 Intentional Damages of Hydraulic Structures Observed in D Canals

Nature of Damage	Responsible Party	Motive
Damage to field canal stilling well weir and gauge	Farmers of head end	To prevent making accurate discharge judgment
Damage to field canal(FC) gates	Farmers with land located below the FC command area	To divert more water to diversion structures or directly to their land
Making holes in canal bank	Do	Discharge water to drainage, divert water to their lands
Damage to the head drop structures in D canal	Farmers from tail end	To deepen the D canal bed, reduce the discharge to head and middle FCs
Reopening old direct farm outlets from D canals or create new ones	Do	Increase flow to their land plots, make sure they can access water during short and intermittent supply

Irrigation Scheduling: The irrigation water releases are concentrated in the cropping seasons[12]. Before the beginning of the cropping season the MASL makes a water distribution calendar, based on the grown crops in last season and the available water. The block offices provide the necessary information to the Mahaweli Regional office, where the schedule is made. Before the beginning of the irrigation season, there is a meeting at the Mahaweli Regional office, with the participation of the block offices, the farmer organizations and the farmers, called the "Kanna Meeting" (Seasonal Meeting). This meeting aims to provide opportunities to all the farmers to discuss their opinions relating to water distribution in the area, with relevant officials. Besides a schedule for irrigation water releases, there is a schedule for canal cleaning, land preparation, sowing, harvesting, paying, etc. The irrigation schedule is a rotation scheme of two weeks, in which water is provided to each field canal for one or more following days. During the first month of the irritation season, water is provided for land preparation. In this period water is available continuously in the canals. The beginning of land preparation is scattered. This means that two weeks after the first fields were irrigated, the other fields start irrigation. As land preparation requires large amounts of water the staggered timing prevents excessive water demand at scheme level. It also facilitates access to land preparation machinery and labor. One month after the beginning of irrigation, irrigation becomes rotational.

12 The words cropping season and off-season may be a bit confusing. Water needs for rice are strictly seasonal, but bananas, which are nowadays promoted, need water during the whole year. As a result, irrigation has changed to more year round irrigation but still water supply is highly seasonal due to the high water needs for rice cultivation and out of habit. Although the cropping season for bananas is year round, the cropping season is still referred to as the cropping season for rice. Most data on water released in all the canals is available for the cropping seasons for rice. For the off-season however, data availability is very limited. The off-season seems only of minor importance to the irrigation engineers.

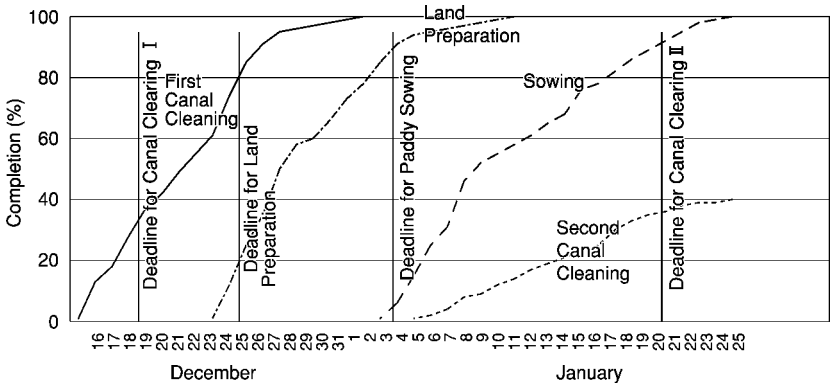
The pre-prepared plan for irrigation is adjusted every week according to the recent water level data of the tank and rainfall. The project office is giving its utmost effort to save some water during the cropping season employing various strategies such as releasing water once in 15 days during off-season and for emergencies. There is however no strict policy on how much water to conserve. In case of water scarcity the Mahaweli Regional office will decide about the best strategy for each case separately. They prioritize the need in water issues according to the situation. If, at the end of the season, the choice is between saving the crops by providing the remaining water of the reservoir and saving water, priority is given to the crops. In 2000/2001 there was no water released for crop cultivation in the Maha season because of lack of water stored in the reservoirs. During this period there were water releases for municipal water supply and domestic purposes. In Yala 2002 each farmer was only allowed to cultivate 0.4 hectare of land out of the hectare they own and the land preparation period was reduced to 15 days.

Progress of the plan prepared pre-seasonally for cultivation in Maha 2005/06 is illustrated in Figure 3. At the end of the season, activities for cleaning and maintenance of the canals were almost 20 days behind the target schedule. Thus the Mahaweli officers have to provide two additional discharges of water for the fields. The observations over the progress of implementation of seasonal cultivation calendar indicate that the canal clearing has been completed in only 40 percent of the canals. According to the MASL officials, about 20 percent of the clearing was done only after delaying the supply of initial irrigation demands[13]. Land preparation progress had been very slow. The main reason given is that no deadlines were informed to some farmers. According to the interviewees, farmers of the head reach never hurry in their farming activities as they have no water problem. They have the ability to maneuver their

13 This is a usual way to force farmers to clear canals

cultivation plans without compromising irrigation water use. Since any water discharges from the D canal has to go in the vicinity of their land, they can take water to their lands compromising the tail end farmers[14]. On the other hand, the tail end farmers who had not been assured of reliable water supply do not see a need for strict adherence of the seasonal plan. On the contrary, the farmers who depend on drainage water for cultivation hurried in land preparations, because they have to be complacent with what ever the water drained off from the main system. This waywardness towards the cultivation planning exerts more pressure on water management, as more irrigation water than initially planed has

Figure 3 Schedules of Farming Practices in Maha 2005/06



14 Within the Uda Walawe irrigation scheme there are big differences in water availability. In general, in the upstream areas there is more water available than in the downstream areas. The upstream areas are the first which are provided with water after interruptions and also water for downstream areas passes through this area which means that at least in the main canal there is water available. This contributes to water availability upstream at the cost of water availability downstream. By the time the water arrives downstream the amount of water is not always sufficient. Besides, it is easier to supply in the needs of the upstream areas because the time between the decision and actual water allocation is shorter and there are less uncertain circumstances. On a smaller scale the differences between head end and tail end also exist on branch canal, distributary canal and field canal level (Buysse, 2002: 12).

to be released to the area. This compromises the water flow to the down stream. Once the down stream extension area is operating in full capacity, this would pose a greater threat of water scarcity for both farmers in existing and extension area.

In the seasonal committee meetings, 3-month paddy varieties are recommended, as to reduce the water requirement. The success of the project heavily depends on adherence to this practice as water availability to irrigate down stream extension area is justified by economizing the water use in the upstream existing area, by using short term paddy varieties and diversifying in to other crops[15]. It is remarkable that less than one percent of the farmers have cultivated the recommended 3 -month paddy variety, while all the other farmers have cultivated 3.5 -months or 4-month varieties, delaying the growth period by further 2 to 3 weeks. Difficulties in marketing and lower market price for short-term rice varieties have diverged farmers from the recommended practice. These factors are disregarded in the seasonal planning, either due to ignorance of officers or suppression by farmers. Demeanor of both parties poses a treat to project success[16].

15 In Udawalawe only 42% of the soils are suitable for paddy cultivation (Piyathilake, 2001: 56). On all other fields paddy cultivation causes huge water losses due to moderately or well-drained soils. Farmers in the region generally have a preference for rice and may grow this even on the less suitable, well drained soils. Using basin irrigation (flooding the fields), this leads to high water losses. The drainage water or return flow can sometimes be used for irrigation downstream but often the better drained soils are close to the river, so the percolation water is lost for irrigation. The Udawalawe irrigation scheme is characterized by a relatively fast return flow to the Udawalawe river (Buysse, 2002: 12).

16 Under the current water management regime, it is doubtful whether the system has the capacity to meet the demands of these users (ADB, 1999: 12) Irrigation water use greatly exceeds design levels, particularly for rice production. This is leading to reduced water flows in many areas, particularly to downstream areas and farms near the end of the irrigation canals. The problem is particularly severe during the dry season (April- September), but can also arise in the wet season (ADB, 1999: 25)

Law enforcement against farmers violating decisions made at cultivation meetings and rules and regulations related to the Operation and Maintenance of the systems were handled by farmer leaders. Law enforcement was easy in the past due to the existence of rural courts, and farmers avoided free riding and violation of decisions taken at cultivation meetings etc., because they feared punishment (Jayakody et al., 2005: 7). With the abolition of rural courts, officers-in-charge at the MASL have to sue the culprits at district courts once farmer representatives make complaints to them, but it involves a long process. Therefore, there is a tendency among the farmers to violate irrigation laws and cultivation decisions at present.

Ⅳ. Sustainability of the Project at the Village Level

For the project to be sustainable, two main criteria have to be met by the local community: first is the assumption of the maintenance responsibilities of the canal system, at least at the field level by the final users; and second is been efficient use of irrigation water in order to supply adequate irrigation for the downstream extension areas. With the introduction of the participatory irrigation management, the farmer organizations had assumed the responsibility of managing water issues and maintenance of the field canals. But it is interesting to observe that with the inception of the project, the farmer organizations in the locale have withdrawn themselves from this liability. Farmer opinions of how the canals should be developed had been taken into account and mid project changes in construction of the canals had been carried out. Altering the designs as perceived by the farmers as best suited for their needs, would bestow a feeling of ownership of the resources and thereby a responsibility for the resources by the farmers. On the contrary, the farmer

organizations, which had collected funds for the contingency maintenance requirements of the canals so far, have also abandoned the practice. As the resources provided are new and by Japanese assistance, the need for a financial endowment by themselves is perceived to be not acute. In their opinion, at the moment labour contributions for the maintenance of the canals by cleaning them twice a season is more than adequate. Larger repairs will not occur in the near future; as if it does the MASL would oversee to it, as the money is coming form a foreign aid. As mentioned above, for 66 percent of the farmers, the word "foreign aid" meant a grant from the foreign government, in this case 'Japan'. Only one third of the farmers were aware of the fact that the Japanese assistance received has to be recovered by the project benefits and paid back in the future. This dependency on the authorities for pecuniary requirements is not good in the context of sustainability of the resources. As mentioned in the chapter five, the MASL is also curtailing as a result of financial restrictions of the government. Thus the bureaucracies whom the farmers are relying on will not be able to maintain the resources effectively in the near future.

On the other hand, the farmers in the existing areas were not well informed about the overall affect of the project. With the continuation of current farming practices, even the farmers in the tail end of the canals in the existing areas are facing water scarcities. It is unquestionable that the system will not have the capacity to irrigate the extension areas as well. Under the crop diversification programmes, the area has been successful in converting some of the farmers in to banana cultivators, reducing the demand for irrigation water compared to paddy farming. But with the failure of the authorities to ensure markets, it has been unable to meet the targets of converting paddy farmers into Other Field Crop (OFC) cultivation. In the face of higher marketing risk the farmers had turned on to the lowest risk available, paddy farming using the

techniques they have used and mastered so far. Thus, new cultivation practices resulting efficient use of irrigation water is sporadic. Inadequacy in only some parts of the system, would lead to sabotage of the irrigation resources by the affected parties, namely tail end farmers and down stream farmers. The best approach to control sabotaging is through farmer organizations, where the cost of monitoring is lower. However, as has discussed earlier, peer farmers and farmer leaders are not taking strict actions as they perceive water scarcity as a dire problem and as each and every farmer has to devise their well being somehow, it is of one way in achieving this.

Ⅴ. Concluding Remarks

The irrigation system has operated effectively in the existing areas but with improvements in irrigation efficiency much below design. Water demand at the upstream of the system is similar to pre project levels despite a rapid increase in non rice crops with low irrigation requirements. While many issues influenced actual outcomes, three interrelated factors played important roles: first, lack of integrated implementation practices among the responsible organizations; second, unanticipated events such as encroachment of lands, that were not promptly addressed; and third, unrealistic expectations of farmers on water availability and officials on water use efficiencies.

The consultancy company has designed the project as such that the canal shape, size in addition to the number and place of outlets in a distributary canal increase the water utilization efficiencies at field levels, facilitating the successful accomplishment of project objectives. The MASL regional officials, as well as the NGO called “World Vision” have acted on the request of farmers, without proper consultancies with the project office and consultants, in modifying the irrigation canal and

outlet designs. This has enabled farmers to continue their current irrigation practices of excessive use of water, threatening the viability of providing irrigation facilities to the extension areas. The situation could have been easily modified, if proper communication networks had been established among the implementation agencies involved in the area, clarifying the objectives and prerequisites of the project.

Moreover, the rehabilitations of main irrigation canals in the upstream existing areas were completed before planning began for downstream development. This has led to a massive migration of encroachers to the area. The interaction between project planning and the encroachers has irreversibly changed the course of development in the area. The encroachers are not willing to shift from their acquired lands, but benefits from irrigation water in the LB main canal, exerting additional demand for irrigation water than intended to supply to the area originally.

Expectations of farmers along with assumptions in project planning has bee unrealistic in nature. Estimated benefits for successive phases of development in original plans assumes that farmers would diversify into cropping systems other than paddy and reduce water use in paddy cultivation. However, farmers anticipating better irrigation facilities along with the rehabilitation of the canals, continued to cultivate rice varieties that require large amounts of water. Because rice remains the staple crop, virtually all farmers seek to grow sufficient rice to meet their domestic needs regardless of the suitability of their soils (ADB, 1999: 17).

The development of the extension area seemed unwarranted by the very high amount of water used in the existing area. The second phase of the project was implemented before management was brought in line with accepTablestandards to meet the needs of the area. The new project did not depart much, in its style from top-down, engineer-oriented projects with the design, settlement processes and economic feasibility dependent upon assumptions of cropping patterns, practices and produc-

tivity that had been ad hoc and unrealistic in the past. The evidence suggests that participatory irrigation management entails a partial devolution of decision making authority to farmers. The main concern of the government has been on setting up of farmer organizations. This initiative has apparently improved communication between farmers and agency personnel, and has fostered farmer participation in decision making to some extend. Yet, government intervention at the level of the transfer unit remains strong. There is general confusion and controversy about the responsibility transfers. First, there is no well-defined process for the transfer of responsibilities of the field canals. Second, there is strong disagreement about responsibilities of maintenance of the field canals. Many farmers oppose full transfer of responsibility for maintenance of distributary channels to Farmer Organizations on the grounds that the farmers cannot afford it. Although hand over is supposed to mean that Farmer Organizations have full operational and maintenance responsibilities for their canals, the MASL continues providing government funds to the Farmer Organizations. This has conveyed an unclear message to farmers of their responsibility over the maintenance of canals.

One of the major issues of the project is its sustainability in the future. Extravagant irrigation water use, practiced before the project is currently continuing. Water shortages are increasingly in evidence. Partly in response, many farmers have destroyed outlet and structures on branch and distributary canals, exacerbating water distribution and management problems. Unless corrected, these modifications have the potential to seriously damage the system capacity. There is increasing evidence that under current usage patterns, the Walawe River water resources are not sufficient to support the full proposed development of irrigation (ADB, 1999: 25). Provision of irrigation facilities at no cost to farmers, combined with limited farmer participation in designing, has resulted in low levels of system ownership. In turn, this has contributed

to widespread damage to structures and water wastage. It is essential for project sustainability that the destruction be reversed and water use limited in the near future, if the irrigation system is to continue to operate effectively. The existing informal institutions in the locale are not strong enough to wield sanctions to control these improper practices. Unless strong action is taken, the problem is likely to spread rapidly as the scheme managers become less able to maintain planned water flows in branch canals and distributary canals.

The institutional environment in the area, both formal and informal, has not been fully compatible with the assumptions of the project design. Inefficiencies in the formal institutions and relaxations of informal institutions have driven encroachment of land resources and inefficient water usage in the area, threatening the sustainability of the project.

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